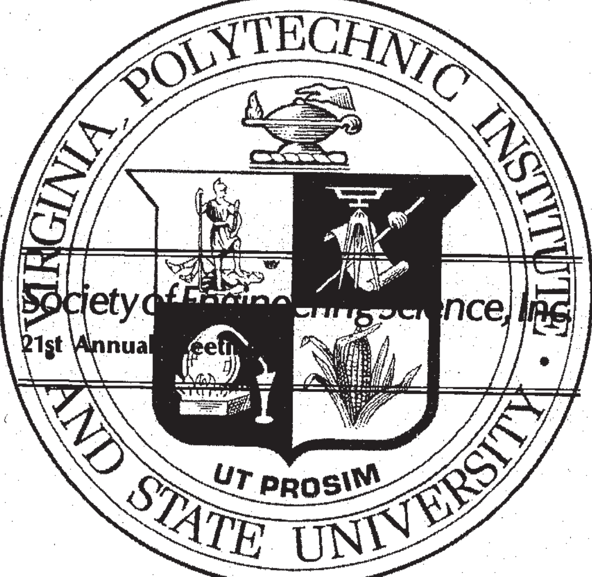
Abstracts



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ARCHEMATICS AND UNFOLDINGS OF THOM'S THEOREM: SOME APPLICATIONS OF THE THEORY OF STRUCTURAL STABILITY

by

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Thom's theory of elementary catastrophes forms a system of topological morphogenesis (1,2,3) which has already been used in various applications. But the semantics encountered in previous works has required more pregnant logos shapes. We could have got over the lack of generalizations of Thom's classification theorem, by considering infinitesimal morphogenetic changes (4,5,6). However, this would have broken the isology with the semantics, as it happens for combinatorial logics in informatics.

Hence we suggest a theory that connects the catastrophic system of structural stability with the catastrophic 'syntagma' defined in (9,10), by means of transversal manifolds. The elementary classification form shall be

s	F(old)	F'	F"	systems of Thom,
y	C(usp)	C'	C"	Arnol'd, Petitot,
n	S(wallowtail)	S'	S"	Aleksandrov, etc.
t	B(utterfly)	B'	B"	
a	H(yperbolic umbilic)	H'	H"	
g	E(llypticumbilic)	E'	H"	
m	P(arabolic umbilic)	P'	P"	
a				

The only syntagma yet formalized is the catastrophic spiral, obtained by connecting syntagmatic units, paradigms of a system. The result was gained by exploring possible connections among the elementary catastrophic manifolds; these connections suggest transversal manifolds, such as spirals, helicoids, bifurcations, new polyhedric manifolds, which are isolgoic to the semantic archetypes.

The manifolds may be crossed by a spatial chiasmus which regulates their equilibria. The 'changing lemma' models the variance archetype, that moves across syntagmatic units or paradigmatic manifolds developed into different systems. The theory is still at a topological stage, but it could be the outset of a catastrophic syntagmatic logic useful in reaching consistency in many scientific applications: unification of forces in physics; moving genes in biology, overcoming the classical DNA helicoidal model; qualitative dynamics of biochips; microcellular catabolias; biological space models relative to creativity and imagination.

The authors have already partially used the synthagmatic theory of elementary catastrophess while modelling the effects of technological innovations on post-industrial space (7,8,9,10,11). Further work is proceeding on problems concerning: spatial desirability in productive and reproductive units; housematic

design, paradoxes in natural and artificial perception; aesthetical morphologies in science and art.

Thom's project of turning his theory on structural stability from one among many formal models into a qualitative "language" for all sciences, may be about to reach the stage of achievement.

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